

# Canadian Journal of Forest Research

Contents  
Volume 28, 1998

# Revue canadienne de recherche forestière

Sommaire  
Volume 28, 1998

## January / janvier

### ARTICLES

- Manuel Lamontagne, Hank Margolis, and Francine Bigras** Photosynthesis of black spruce, jack pine, and trembling aspen after artificially induced frost during the growing season 1
- Michael Drexhage and Franz Gruber** Architecture of the skeletal root system of 40-year-old *Picea abies* on strongly acidified soils in the Harz Mountains (Germany) 13
- Donald L. Sachs, Phillip Sollins, and Warren B. Cohen** Detecting landscape changes in the interior of British Columbia from 1975 to 1992 using satellite imagery 23
- P. Réchon, D. Paré, and C. Messier** Development of an improved model estimating the nutrient content of the bole for four boreal tree species 37
- Jian R. Wang, C.D.B. Hawkins, and Tony Letchford** Relative growth rate and biomass allocation of paper birch (*Betula papyrifera*) populations under different soil moisture and nutrient regimes 44
- Pierre Dutilleul, Marc Herman, and Tomas Avella-Shaw** Growth rate effects on correlations among ring width, wood density, and mean tracheid length in Norway spruce (*Picea abies*) 56
- H.E. Stelzer, G.S. Foster, V. Shaw, and J.B. McRae** Ten-year growth comparison between rooted cuttings and seedlings of loblolly pine 69
- William Scott, Rodney Meade, Richard Leon, David Hyink, and Richard Miller** Planting density and tree-size relations in coast Douglas-fir 74
- Tuija S. Aronen, Teijo O. Nikkanen, and Hely M. Häggman** Compatibility of different pollination techniques with micro-projectile bombardment of Norway spruce and Scots pine pollen 79
- Hiroyuki Sase, Takejiro Takamatsu, and Tomio Yoshida** Variation in amount and elemental composition of epicuticular wax in Japanese cedar (*Cryptomeria japonica*) leaves associated with natural environmental factors 87
- C.H. Briand, S. Gauthier, J.-F. Lemay, S. Laliberté, and M.-F. Tremblay** Relationship between field performance, family, embryo morphology, and isozyme heterozygosity, and in vitro reactivity in jack pine 98
- Boris Zeide** Fractal analysis of foliage distribution in loblolly pine crowns 106
- Steven L. Miller, Therese M. McClean, Nancy L. Stanton, and Stephen E. Williams** Mycorrhization, physiognomy, and first-year survivability of conifer seedlings following natural fire in Grand Teton National Park 115
- G. Silva, J.-C. Ruel, M. Samson et D. Pin** Influence de quelques défauts externes sur la stabilité des arbres face à une simulation mécanique de l'action du vent 123
- K. Regina, H. Nykänen, M. Maljanen, J. Silvola, and P.J. Martikainen** Emissions of N<sub>2</sub>O and NO and net nitrogen mineralization in a boreal forested peatland treated with different nitrogen compounds 132
- T.M. Frontz, D.D. Davis, B.A. Bunyard, and D.J. Royse** Identification of *Armillaria* species isolated from bigtooth aspen based on rDNA RFLP analysis 141
- NOTE
- J.N. Gemma, R.E. Koske, E.M. Roberts, and S. Hester** Response of *Taxus canadensis* var. *densiformis* to inoculation with arbuscular mycorrhizal fungi 150
- DISCUSSION
- G. Hughes and L.V. Madden** Comment—Using spatial and temporal patterns of *Armillaria* root disease to formulate management recommendations for Ontario's black spruce (*Picea mariana*) seed orchards 154

Announcement / Annonce	iii
Instructions to authors	I-1
Recommandations aux auteurs	R-1

**February / février**

## REVIEW / SYNTHÈSE

Clas Fries, Mattias Carlsson, Bo Dahlin, Tomas Lämås, and Ola Sallnäs	A review of conceptual landscape planning models for multiobjective forestry in Sweden	159
---	--	-----

## ARTICLES

Thomas P. Sullivan, Robert G. Wagner, Douglas G. Pitt, R.A. Lautenschlager, and Din G. Chen	Changes in diversity of plant and small mammal communities after herbicide application in sub-boreal spruce forest	168
Kari Minkkinen and Jukka Laine	Effect of forest drainage on the peat bulk density of pine mires in Finland	178
M.U. Stoehr, B.L. Orvar, T.M. Vo, J.R. Gawley, J.E. Webber, and C.H. Newton	Application of a chloroplast DNA marker in seed orchard management evaluations of Douglas-fir	187
Meredith W. Cornett, Klaus J. Puettmann, and Peter B. Reich	Canopy type, forest floor, predation, and competition influence conifer seedling emergence and early survival in two Minnesota conifer-deciduous forests	196
V. Malik and V.R. Timmer	Biomass partitioning and nitrogen retranslocation in black spruce seedlings on competitive mixedwood sites: a bioassay study	206
Annikki Mäkelä and Petteri Vanninen	Impacts of size and competition on tree form and distribution of aboveground biomass in Scots pine	216
Kimberly F. Wallin and Kenneth F. Raffa	Association of within-tree jack pine budworm feeding patterns with canopy level and within-needle variation of water, nutrient, and monoterpene concentrations	228
G. Geoff Wang	An ecologically based model for site index conversion among species	234
Darius M. Adams, Ralph J. Alig, Bruce A. McCarl, Steven M. Winnett, and J.M. Callaway	The effects of factor supply assumptions on intertemporal timber supply behavior: the cases of investable funds and land	239
S.D. Carson and J.D. Hayes	Diameter and height distributions in genetically improved <i>Pinus radiata</i>	248
P.F. Newton and P.A. Jolliffe	Assessing processes of intraspecific competition within spatially heterogeneous black spruce stands	259
D. Lindgren and T.J. Mullin	Relatedness and status number in seed orchard crops	276
D.F. Clark, D.D. Kneeshaw, P.J. Burton, and J.A. Antos	Coarse woody debris in sub-boreal spruce forests of west-central British Columbia	284
Anne Toppinen	Incorporating cointegration relations in a short-run model of the Finnish sawlog market	291
Thomas C. Hutchinson, Shaun A. Watmough, Eric P.S. Sager, and Jim D. Karagatzides	Effects of excess nitrogen deposition and soil acidification on sugar maple ( <i>Acer saccharum</i> ) in Ontario, Canada: an experimental study	299
Jean J. Turgeon, Eckehard G. Brockerhoff, Domenic A. Lombardo, Linda MacDonald, and Gary G. Grant	Differences in composition and release rate of volatiles emitted by black spruce seed cones sampled in situ versus ex situ	311

## NOTE

B. Ziegenhagen, F. Scholz, A. Madaghiele, and G.G. Vendramin	Chloroplast microsatellites as markers for paternity analysis in <i>Abies alba</i>	317
--	--	-----

**March / mars**

## ARTICLES

Zvi Mendel	Biogeography of <i>Matsucoccus josephi</i> (Homoptera: Matsucoccidae) as related to host resistance in <i>Pinus brutia</i> and <i>Pinus halepensis</i>	323
Patrick H. Brose and David H. Van Lear	Responses of hardwood advance regeneration to seasonal prescribed fires in oak-dominated shelterwood stands	331
Urban Eriksson, Gunnar Jansson, and Curt Almqvist	Seed and pollen production after stem injections of gibberellin A <sub>4/7</sub> in field-grown seed orchards of <i>Pinus sylvestris</i>	340

<b>Charles M. Ruffner and Marc D. Abrams</b> Relating land-use history and climate to the dendroecology of a 326-year-old <i>Quercus prinus</i> talus slope forest	347
<b>Paul C. Marino and Katherine L. Gross</b> Competitive effects of conspecific and herbaceous (weeds) plants on growth and branch architecture of <i>Populus neauramericana</i> cv. Eugenei	359
<b>Erik Næsset</b> Positional accuracy of boundaries between clearcuts and mature forest stands delineated by means of aerial photointerpretation	368
<b>Scott J. Goetz and Stephen D. Prince</b> Variability in carbon exchange and light utilization among boreal forest stands: implications for remote sensing of net primary production	375
<b>James A. Entry and William H. Emmingham</b> Influence of forest age on forms of carbon in Douglas-fir soils in the Oregon Coast Range	390
<b>Simon M. Landhäusser and Victor J. Lieffers</b> Growth of <i>Populus tremuloides</i> in association with <i>Calamagrostis canadensis</i>	396
<b>Veli-Matti Komulainen, Hannu Nykänen, Pertti J. Martikainen, and Jukka Laine</b> Short-term effect of restoration on vegetation change and methane emissions from peatlands drained for forestry in southern Finland	402
<b>Abul K.M. Ekramoddoullah, Joanne J. Davidson, and Doug W. Taylor</b> A protein associated with frost hardiness of western white pine is up-regulated by infection in the white pine blister rust pathosystem	412
<b>Michael U. Stoehr, Sylvia J. L'Hirondelle, Wolfgang D. Binder, and Joe E. Webber</b> Parental environment aftereffects on germination, growth, and adaptive traits in selected white spruce families	418
<b>John M. Goodburn and Craig G. Lorimer</b> Cavity trees and coarse woody debris in old-growth and managed northern hardwood forests in Wisconsin and Michigan	427
<b>Harry X. Wu and Cheng C. Ying</b> Stability of resistance to western gall rust and needle cast in lodgepole pine provenances	439
<b>Gunnar Jansson, Öje Danell, and Lars-Göran Stener</b> Correspondence between single-tree and multiple-tree plot genetic tests for production traits in <i>Pinus sylvestris</i>	450
<b>J.M.H. Weir and E.A. Johnson</b> Effects of escaped settlement fires and logging on forest composition in the mixedwood boreal forest	459
<b>Christian Dussault, Réhaume Courtois et Jean Ferron</b> Impact à court terme d'une coupe avec protection de la régénération sur la gélinotte huppée ( <i>Bonasa umbellus</i> ) en forêt boréale	468
<b>Rong-Cai Yang, Narinder K. Dhir, and Leonard K. Barnhardt</b> Comparative assessment of genetic variation of young high-elevation lodgepole pine for height and western gall rust resistance across two sites in Alberta	478
NOTES	
<b>Knut Kielland, Bruce Barnett, and Don Schell</b> Intraseasonal variation in the $\delta^{15}\text{N}$ signature of taiga trees and shrubs	485
<b>L.B. Nadeau, D.J. Pluth, and P.V. Blenis</b> Height and foliar responses of white spruce and lodgepole pine seedlings to deep tillage of Gray Luvisols	489
<b>Jason D. Demers, Thomas D. Lee, and James P. Barrett</b> Substrate type and the distribution of sugar maple at its elevational limit in the White Mountains, New Hampshire	494
ERRATUM	
<b>H.E. Stelzer, G.S. Foster, D.V. Shaw, and J.B. McRae</b> Erratum: Ten-year growth comparison between rooted cuttings and seedlings of loblolly pine	499
<b>April / avril</b>	
ARTICLES	
<b>R.A. Schmidt, C.A. Troendle, and J.R. Meiman</b> Sublimation of snowpacks in subalpine conifer forests	501
<b>Peter M. Lafleur, J. Harry McCaughey, Paul A. Bartlett, and Ian B. Strachan</b> Observations of the micrometeorology of two forests in eastern Canada. 1. Interannual variations in summer radiation and energy balance	514
<b>J. Renée Brooks, Lawrence B. Flanagan, and James R. Ehleringer</b> Responses of boreal conifers to climate fluctuations: indications from tree-ring widths and carbon isotope analyses	524
<b>Robert G. Striegl and Kimberly P. Wickland</b> Effects of a clear-cut harvest on soil respiration in a jack pine – lichen woodland	534
<b>G.R. Johnson</b> Parental GCA testing: How many crosses per parent?	540
<b>Hiroyuki Sase, Takejiro Takamatsu, Tomio Yoshida, and Kazuyuki Inubushi</b> Changes in properties of epicuticular wax and the related water loss in Japanese cedar ( <i>Cryptomeria japonica</i> ) affected by anthropogenic environmental factors	546

<b>Aija Ryyppö, Tapani Repo, and Elina Vapaavuori</b> Development of freezing tolerance in roots and shoots of Scots pine seedlings at nonfreezing temperatures	557
<b>Limin Xiong, Naoki Okada, Takeshi Fujiwara, Sadaaki Ohta, and Jonathan G. Palmer</b> Chronology development and climate response analysis of different New Zealand pink pine ( <i>Halocarpus biformis</i> ) tree-ring parameters	566
<b>D.M. Goodman and J.A. Trofymow</b> Comparison of communities of ectomycorrhizal fungi in old-growth and mature stands of Douglas-fir at two sites on southern Vancouver Island	574
<b>Jaume Fons and Karel Klinka</b> Temporal variations of forest floor properties in the Coastal Western Hemlock zone of southern British Columbia	582
<b>John H. Markham and C.P. Chanway</b> Response of red alder ( <i>Alnus rubra</i> ) seedlings to a woolly alder sawfly ( <i>Eriocampa ovata</i> ) outbreak	591
<b>Jonathan J. Ruel, Matthew P. Ayres, and Peter L. Lorio, Jr.</b> Loblolly pine responds to mechanical wounding with increased resin flow	596
<b>Jeffrey D. DeBell, Barbara L. Gartner, and Dean S. DeBell</b> Fiber length in young hybrid <i>Populus</i> stems grown at extremely different rates	603
<b>Romana Ruzič, Igor Jerman, and Nada Gogala</b> Effects of weak low-frequency magnetic fields on spruce seed germination under acid conditions	609
<b>Clark S. Binkley and Daowei Zhang</b> Impact of timber-fee increases on British Columbia forest products companies: an economic and policy analysis	617
<b>Peter Brang</b> Early seedling establishment of <i>Picea abies</i> in small forest gaps in the Swiss Alps	626

## May / mai

### ARTICLES

<b>Ronald F. Smith</b> Effects of stem injections of gibberellin A <sub>47</sub> and paclobutrazol on sex expression and the within-crown distribution of seed and pollen cones in black spruce ( <i>Picea mariana</i> )	641
<b>Sun Joseph Chang</b> A generalized Faustmann model for the determination of optimal harvest age	652
<b>Andrew P. Robinson and Thomas E. Burk</b> Sequential sampling of normal and non-normal populations	660
<b>Robert L. Edmonds and David S. Lebo</b> Diversity, production, and nutrient dynamics of fungal sporocarps on logs in an old-growth temperate rain forest, Olympic National Park, Washington	665
<b>A.M. Qureshi and V.R. Timmer</b> Exponential fertilization increases nutrient uptake and ectomycorrhizal development of black spruce seedlings	674
<b>F.D. Caccia and C.L. Ballaré</b> Effects of tree cover, understory vegetation, and litter on regeneration of Douglas-fir ( <i>Pseudotsuga menziesii</i> ) in southwestern Argentina	683
<b>Timo Pukkala and Jari Miina</b> Tree-selection algorithms for optimizing thinning using a distance-dependent growth model	693
<b>Erhard John Dobesberger</b> Stochastic simulation of growth loss in thinned balsam fir stands defoliated by the spruce budworm in Newfoundland	703
<b>Janaki R.R. Alavalapati, Wiktor L. Adamowicz, and William A. White</b> A comparison of economic impact assessment methods: the case of forestry developments in Alberta	711
<b>Franck Brignolas, François Lieutier, Daniel Sauvard, Erik Christiansen, and Alan A. Berryman</b> Phenolic predictors for Norway spruce resistance to the bark beetle <i>Ips typographus</i> (Coleoptera: Scolytidae) and an associated fungus, <i>Ceratocystis polonica</i>	720
<b>Raynald Paquin, Hank A. Margolis, and René Doucet</b> Nutrient status and growth of black spruce layers and planted seedlings in response to nutrient addition in the boreal forest of Quebec	729
<b>Carole Desplanque, Christian Rolland et Richard Michalet</b> Dendroécologie comparée du sapin blanc ( <i>Abies alba</i> ) et de l'épicéa commun ( <i>Picea abies</i> ) dans une vallée alpine de France	737
<b>S.A. Acker, E.K. Zenner, and W.H. Emmingham</b> Structure and yield of two-aged stands on the Willamette National Forest, Oregon: implications for green tree retention	749
<b>Malin Bendz-Hellgren and Jan Stenlid</b> Effects of clear-cutting, thinning, and wood moisture content on the susceptibility of Norway spruce stumps to <i>Heterobasidion annosum</i>	759
<b>Anne Nguyen-Queyrens, André Ferhi, Denis Loustau, and Jean-Marc Guehl</b> Within-ring $\delta^{13}\text{C}$ spatial variability and inter-annual variations in wood cellulose of two contrasting provenances of <i>Pinus pinaster</i>	766

- Colin J. Long, Cathy Whitlock, Patrick J. Bartlein, and Sarah H. Millsaugh** A 9000-year fire history from the Oregon Coast Range, based on a high-resolution charcoal study 774

## NOTES

- Jeff N. Stone, Andy MacKinnon, John V. Parminter, and Ken P. Lertzman** Coarse woody debris decomposition documented over 65 years on southern Vancouver Island 788
- Michael S. Williams and Hans T. Schreuder** Outlier-resistant estimators for Poisson sampling: a note 794

## June / juin

## ARTICLES

- T.M. Hurd, A.R. Brach, and D.J. Raynal** Response of understory vegetation of Adirondack forests to nitrogen additions 799
- N. Buchmann, T.M. Hinckley, and J.R. Ehleringer** Carbon isotope dynamics in *Abies amabilis* stands in the Cascades 808
- Shihe Fan and Steven C. Grossnickle** Comparisons of gas exchange parameters and shoot water relations of interior spruce (*Picea glauca* (Moench) Voss  $\times$  *Picea engelmannii* Parry ex Engelm.) clones under repeated soil drought 820
- Steven C. Grossnickle and Shihe Fan** Genetic variation in summer gas exchange patterns of interior spruce (*Picea glauca* (Moench) Voss  $\times$  *Picea engelmannii* Parry ex Engelm.) 831
- F.M. Moola, A.U. Mallik, and R.A. Lautenschlager** Effects of conifer release treatments on the growth and fruit production of *Vaccinium* spp. in northwestern Ontario 841
- Hayley Hessel, Douglas B. Rideout, and Philip N. Omi** Using catastrophe theory to model wildfire behavior and control 852
- John N. King, C. Cartwright, J. Hatton, and A.D. Yanchuk** The potential of improving western hemlock pulp and paper quality. I. Genetic control and interrelationships of wood and fibre traits 863
- Elaine F. Wright, K. Dave Coates, Charles D. Canham, and Paula Bartemucci** Species variability in growth response to light across climatic regions in northwestern British Columbia 871
- Mingguang Xu and Timothy B. Harrington** Foliage biomass distribution of loblolly pine as affected by tree dominance, crown size, and stand characteristics 887
- Rose-Marie Rytter and Lars Rytter** Growth, decay, and turnover rates of fine roots of basket willows 893
- Tannis Beardmore and Wendy Vong** Role of the cotyledonary tissue in improving low and ultralow temperature tolerance of butternut (*Juglans cinerea*) embryonic axes 903
- Jon Kehlet Hansen and Hans Roulund** Spiral grain in a clonal trial with Sitka spruce 911
- Jon Kehlet Hansen and Hans Roulund** Genetic parameters for spiral grain in two 18-year-old progeny trials with Sitka spruce in Denmark 920

## NOTES

- Peter M. Brown, Wayne D. Shepperd, Stephen A. Mata, and Douglas L. McClain** Longevity of windthrown logs in a subalpine forest of central Colorado 932
- Anders Fries and Tore Ericsson** Genetic parameters in diallel-crossed Scots pine favor heartwood formation breeding objectives 937
- Philip J. Radtke and Harold E. Burkhart** A comparison of methods for edge-bias compensation 942
- Marja-Liisa Sutinen, Aulis Ritari, Teuvo Holappa, and Kauko Kujala** Seasonal changes in soil temperature and in the frost hardness of Scots pine (*Pinus sylvestris*) roots under subarctic conditions 946

## ERRATA

- Manuel Lamontagne, Hank Margolis, and Francine Bigras** Erratum: Photosynthesis of black spruce, jack pine, and trembling aspen after artificially induced frost during the growing season 951
- D.M. Goodman and J.A. Trofymow** Erratum: Comparison of communities of ectomycorrhizal fungi in old-growth and mature stands of Douglas-fir at two sites on southern Vancouver Island 952

## July / juillet

## ARTICLES

- D.J. Campbell** Salt-wind induced wave regeneration in coastal pine forests in New Zealand 953
- Rimvydas Vasiliauskas and Jan Stenlid** Spread of S and P group isolates of *Heterobasidion annosum* within and among *Picea abies* trees in central Lithuania 961



- Neal A. Scott, Roger L. Parfitt, Des J. Ross, and Gareth J. Salt** Carbon and nitrogen transformations in New Zealand plantation forest soils from sites with different N status 967
- Yong-Bi Fu, G. Peter Y. Clarke, Gene Namkoong, and Alvin D. Yanchuk** Incomplete block designs for genetic testing: statistical efficiencies of estimating family means 977
- Nuno M.G. Borralho and Gregory W. Dutkowski** Comparison of rolling front and discrete generation breeding strategies for trees 987
- J.R. Mosedale, F. Feuillat, R. Baumes, J.-L. Dupouey, and J.-L. Puech** Variability of wood extractives among *Quercus robur* and *Quercus petraea* trees from mixed stands and their relation to wood anatomy and leaf morphology 994
- Marilou Beaudet and Christian Messier** Growth and morphological responses of yellow birch, sugar maple, and beech seedlings growing under a natural light gradient 1007
- S. Magnussen and P. Boudewyn** Derivations of stand heights from airborne laser scanner data with canopy-based quantile estimators 1016
- Karin Öhman and Ljusk Ola Eriksson** The core area concept in forming contiguous areas for long-term forest planning 1032
- Gregory A. Carter, Michael R. Seal, and Tim Haley** Airborne detection of southern pine beetle damage using key spectral bands 1040
- D. Olszyk, Claudia Wise, Erica VanEss, and David Tingey** Elevated temperature but not elevated CO<sub>2</sub> affects long-term patterns of stem diameter and height of Douglas-fir seedlings 1046
- Karl W. Kleiner, Kenneth F. Raffa, David D. Ellis, and Brent H. McCown** Effect of nitrogen availability on the growth and phytochemistry of hybrid poplar and the efficacy of the *Bacillus thuringiensis cryIA(a)* *d*-endotoxin on gypsy moth 1055

## NOTES

- Jukka Jokimäki, Esa Huhta, Juhani Itämiies, and Pekka Rahko** Distribution of arthropods in relation to forest patch size, edge, and stand characteristics 1068
- Shaun A. Watmough and Thomas C. Hutchinson** Relationship between soil metal contamination and metal resistance of callus established from mature red maple 1073
- Antal Kozak** Effects of upper stem measurements on the predictive ability of a variable-exponent taper equation 1078
- Alan T. Murray** Route planning for harvest site access 1084
- Mama Nsangou and Michael Greenwood** Physiological and morphological differences between somatic, in vitro germinated, and normal seedlings of red spruce (*Picea rubens* Sarg.) 1088

## DISCUSSION

- Alan T. Murray** Ecosystem management or infeasible guidelines? Implications of adjacency restrictions for wildlife habitat and timber production 1093
- Douglas R. Carter, Moschos Vogiatzis, Charles B. Moss, and Loukas G. Arvanitis** Reply: Ecosystem management or infeasible guidelines? Implications of adjacency restrictions for wildlife habitat and timber production 1095
- John Nelson** Reply: Ecosystem management or infeasible guidelines? Implications of adjacency restrictions for wildlife habitat and timber production 1096

## ERRATUM

- V. Clark Baldwin, Jr., Kelly D. Peterson, Harold E. Burkhart, Ralph L. Amateis, and Phillip M. Dougherty** Erratum: Equations for estimating loblolly pine branch and foliage weight and surface area distributions 1097

## August / Août

## ARTICLES

- Michael S. Williams** Distinguishing between change and growth in forest surveys 1099
- Matti Maltamo and Annika Kangas** Methods based on *k*-nearest neighbor regression in the prediction of basal area diameter distribution 1107
- Shawna L. Naidu, Evan H. DeLucia, and Richard B. Thomas** Contrasting patterns of biomass allocation in dominant and suppressed loblolly pine 1116
- Christophe Panaïotis, Roger Loisel et Maurice Roux** Analyse de la réponse de la végétation aux trouées naturelles dans une futaie âgée de *Quercus ilex* L. en Corse (île Méditerranéenne) 1125

<b>R.C. Schmidting and V. Hipkins</b>	Genetic diversity in longleaf pine ( <i>Pinus palustris</i> ): influence of historical and prehistorical events	1135
<b>John N. Owens and Sheila J. Morris</b>	Factors affecting seed and cone development in Pacific silver fir ( <i>Abies amabilis</i> )	1146
<b>Carol A. Aubry, W.T. Adams, and Thomas D. Fahey</b>	Determination of relative economic weights for multitrait selection in coastal Douglas-fir	1164
<b>Yue Wang, Stephen J. Titus, and Valerie M. LeMay</b>	Relationships between tree slenderness coefficients and tree or stand characteristics for major species in boreal mixedwood forests	1171
<b>David C. LeBlanc</b>	Interactive effects of acidic deposition, drought, and insect attack on oak populations in the midwestern United States	1184
<b>Paige E. Axelrood, William K. Chapman, Keith A. Seifert, David B. Trotter, and Gwen Shrimpton</b>	<i>Cylindrocarpon</i> and <i>Fusarium</i> root colonization of Douglas-fir seedlings from British Columbia reforestation sites	1198
<b>Rick G. Kelsey and Gladwin Joseph</b>	Ethanol in Douglas-fir with black-stain root disease ( <i>Leptographium wageneri</i> )	1207
<b>J. Clive Carlyle, E.K. Sadanandan Nambiar, and Mark W. Bligh</b>	The use of laboratory measurements to predict nitrogen mineralization and nitrification in <i>Pinus radiata</i> plantations after harvesting	1213
<b>J. Clive Carlyle, Mark W. Bligh, and E.K. Sadanandan Nambiar</b>	Woody residue management to reduce nitrogen and phosphorus leaching from sandy soil after clear-felling <i>Pinus radiata</i> plantations	1222
<b>Douglas A. Maguire, John C. Brissette, and Lianhong Gu</b>	Crown structure and growth efficiency of red spruce in uneven-aged, mixed-species stands in Maine	1233
<b>Lee C. Wensel and Eric C. Turnblom</b>	Adjustment of estimated tree growth rates in northern California conifers for changes in precipitation levels	1241
<b>J.J. Boreux, C. Gadbin-Henry, J. Guiot, and L. Tessier</b>	Radial tree-growth modelling with fuzzy regression	1249
NOTE		
<b>Stephen C. Hart and Phil Sollins</b>	Soil carbon and nitrogen pools and processes in an old-growth conifer forest 13 years after trenching	1261

## September / septembre

### ARTICLES

<b>Kari Minkkinen and Jukka Laine</b>	Long-term effect of forest drainage on the peat carbon stores of pine mires in Finland	1267
<b>Cindy M. Hale and John Pastor</b>	Nitrogen content, decay rates, and decompositional dynamics of hollow versus solid hardwood logs in hardwood forests of Minnesota, U.S.A.	1276
<b>F. Soria, F. Basurco, G. Toval, L. Silió, M.C. Rodriguez, and M. Toro</b>	An application of Bayesian techniques to the genetic evaluation of growth traits in <i>Eucalyptus globulus</i>	1286
<b>Shelly R. Feeney, Thomas E. Kolb, W. Wallace Covington, and Michael R. Wagner</b>	Influence of thinning and burning restoration treatments on presettlement ponderosa pines at the Gus Pearson Natural Area	1295
<b>D.F. Greene and E.A. Johnson</b>	Seed mass and early survivorship of tree species in upland clearings and shelterwoods	1307
<b>R.J. Hall, W.J.A. Volney, and Y. Wang</b>	Using a geographic information system (GIS) to associate forest stand characteristics with top kill due to defoliation by the jack pine budworm	1317
<b>C.E. Prescott and S.M. Brown</b>	Five-year growth response of western red cedar, western hemlock, and amabilis fir to chemical and organic fertilizers	1328
<b>Jean Ferron, François Potvin, and Christian Dussault</b>	Short-term effects of logging on snowshoe hares in the boreal forest	1335
<b>Hubert Sterba and Ralph L. Amateis</b>	Crown efficiency in a loblolly pine ( <i>Pinus taeda</i> ) spacing experiment	1344
<b>Elaine F. Wright, K. Dave Coates, and Paula Bartemucci</b>	Regeneration from seed of six tree species in the interior cedar-hemlock forests of British Columbia as affected by substrate and canopy gap position	1352
<b>Patrick J. McHale, Myron J. Mitchell, and Francis P. Bowles</b>	Soil warming in a northern hardwood forest: trace gas fluxes and leaf litter decomposition	1365
<b>Björn Hannrup and Inger Ekberg</b>	Age-age correlations for tracheid length and wood density in <i>Pinus sylvestris</i>	1373
<b>D. Korber, T. Beckley, M. Luckert, and W. White</b>	Cultural, geographical, and sectoral refinements to measures of forest industry dependence	1380

- Torsten W. Berger and Gerhard Glatzel** Canopy leaching, dry deposition, and cycling of calcium in Austrian oak stands as a function of calcium availability and distance from a lime quarry 1388
- L.A. Venier, A.A. Hopkin, D.W. McKenney, and Y. Wang** A spatial, climate-determined risk rating for Scleroderris disease of pines in Ontario 1398
- Matthew E. Baker and Burton V. Barnes** Landscape ecosystem diversity of river floodplains in northwestern Lower Michigan, U.S.A. 1405
- E.A. Pinkard and C.L. Beadle** Aboveground biomass partitioning and crown architecture of *Eucalyptus nitens* following green pruning 1419

## October / Octobre

### ARTICLES

- Timothy G. Gregoire** Design-based and model-based inference in survey sampling: appreciating the difference 1429
- Kazi M.S. Islam and David L. Martell** Performance of initial attack airtanker systems with interacting bases and variable initial attack ranges 1448
- Steven P. Hamburg and Teng-Chiu Lin** Throughfall chemistry of an ecotonal forest on the edge of the Great Plains 1456
- Ronald R. Martin, T.K. Sham, G. Wong Won, Paul van der Heide, Keith W. Jones, Sheng-Rong Song, and Richard Protz** Secondary ion mass spectroscopy and synchrotron X-ray fluorescence in the study of the qualitative variation in metal content with time in tree rings 1464
- Geraldine L. Tierney and Timothy J. Fahey** Soil seed bank dynamics of pin cherry in a northern hardwood forest, New Hampshire, U.S.A. 1471
- Erkki Koskela and Markku Ollikainen** A game-theoretic model of timber prices with capital stock: an empirical application to the Finnish pulp and paper industry 1481
- Marcel Darveau, Jean Huot, and Louis Bélanger** Riparian forest strips as habitat for snowshoe hare in a boreal balsam fir forest 1494
- L.M. Trummer, P.E. Hennon, E.M. Hansen, and P.S. Muir** Modeling the incidence and severity of hemlock dwarf mistletoe in 110-year-old wind-disturbed forests in Southeast Alaska 1501
- O. García** Estimating top height with variable plot sizes 1509
- Yuwu Lian and Qishui Zhang** Conversion of a natural broad-leaved evergreen forest into pure and mixed plantation forests in a subtropical area: effects on nutrient cycling 1518
- Curt Almqvist, Urban Bergsten, Lennart Bondesson, and Urban Eriksson** Predicting germination capacity of *Pinus sylvestris* and *Picea abies* seeds using temperature data from weather stations 1530
- K.-A. Högberg, I. Ekberg, L. Norell, and S. von Arnold** Integration of somatic embryogenesis in a tree breeding programme: a case study with *Picea abies* 1536
- Andrew M. Paterson, Brian F. Cumming, John P. Smol, Jules M. Blais, and Robert L. France** Assessment of the effects of logging, forest fires and drought on lakes in northwestern Ontario: a 30-year paleolimnological perspective 1546
- Andreas Hamann, Y.A. El-Kassaby, M.P. Koshy, and G. Namkoong** Multivariate analysis of allozymic and quantitative trait variation in *Alnus rubra*: geographic patterns and evolutionary implications 1557
- Terry M. Shaw, James A. Moore, and John D. Marshall** Root chemistry of Douglas-fir seedlings grown under different nitrogen and potassium regimes 1566
- J.K. Vreeland, F.A. Servello, and B. Griffith** Effects of conifer release with glyphosate on summer forage abundance for deer in Maine 1574

### NOTE

- F.M. Moola and A.U. Mallik** Phenology of *Vaccinium* spp. in a black spruce (*Picea mariana*) plantation in northwestern Ontario: possible implications for the timing of forest herbicide treatments 1579

### ERRATUM

- Hayley Hessel, Douglas B. Rideout, and Philip N. Omi** Erratum: Using catastrophe theory to model wildfire behavior and control 1586



**November / novembre**

## ARTICLES

- P.F. Newton and P.A. Jolliffe** Aboveground modular component responses to intraspecific competition within density-stressed black spruce stands 1587
- Karen A. Thamarus and Glenn R. Furnier** Temporal and genotypic variation of wound-induced gene expression in bark of *Populus tremuloides* and *P. grandidentata* 1611
- Michel Labrecque, Traian I. Teodorescu, and Stéphane Daigle** Early performance and nutrition of two willow species in short-rotation intensive culture fertilized with wastewater sludge and impact on the soil characteristics 1621
- Lars Vesterdal and Karsten Raulund-Rasmussen** Forest floor chemistry under seven tree species along a soil fertility gradient 1636
- Jonathan G. Martin, Brian D. Kloeppel, Tara L. Schaefer, Darrin L. Kimbler, and Steven G. McNulty** Aboveground biomass and nitrogen allocation of ten deciduous southern Appalachian tree species 1648
- Karen Kuers and Klaus Steinbeck** Leaf area dynamics in *Liquidambar styraciflua* saplings: responses to nitrogen fertilization 1660
- Karen Kuers and Klaus Steinbeck** Foliar nitrogen dynamics in *Liquidambar styraciflua* saplings: response to nitrogen fertilization 1671
- Paul C. Van Deusen, Larry L. Irwin, and Tracy L. Fleming** Survival estimates for the northern spotted owl 1681
- Harri Mäkinen and Francis Colin** Predicting branch angle and branch diameter of Scots pine from usual tree measurements and stand structural information 1686
- E. Keith Deglow and John H. Borden** Green leaf volatiles disrupt and enhance response to aggregation pheromones by the ambrosia beetle, *Gnathotrichus sulcatus* (Coleoptera: Scolytidae) 1697
- R.E. Dickson, M.D. Coleman, D.E. Riemenschneider, J.G. Isebrands, G.D. Hogan, and D.F. Karnosky** Growth of five hybrid poplar genotypes exposed to interacting elevated CO<sub>2</sub> and O<sub>3</sub> 1706
- Bernhard Stadler and Beate Michalzik** Aphid infested Norway spruce are "hot spots" in throughfall carbon chemistry in coniferous forests 1717
- William T. Peterjohn, Richard J. McGervey, Alan J. Sexstone, Martin J. Christ, Cassie J. Foster, and Mary B. Adams** Nitrous oxide production in two forested watersheds exhibiting symptoms of nitrogen saturation 1723
- Jean-Noël Candau, Richard A. Fleming, and Anthony Hopkin** Spatiotemporal patterns of large-scale defoliation caused by the spruce budworm in Ontario since 1941 1733

**December / décembre**

## ARTICLES

- Han Y.H. Chen, Karel Klinka, and Richard D. Kabzems** Site index, site quality, and foliar nutrients of trembling aspen: relationships and predictions 1743
- G.C. Clarke and D.C. Malcolm** Location of cones in the crown and along shoots of Sitka spruce (*Picea sitchensis* (Bong.) Carr.) and the influence of coning intensity and shoot size 1756
- S.A. Billings, D.D. Richter, and J. Yarie** Soil carbon dioxide fluxes and profile concentrations in two boreal forests 1773
- W. Jan A. Volney** Ten-year tree mortality following a jack pine budworm outbreak in Saskatchewan 1784
- Richard C. Yang** Foliage and stand growth responses of semimature lodgepole pine to thinning and fertilization 1794
- P.P. Kormanik, S.S. Sung, T.L. Kormanik, S.E. Schlarbaum, and S.J. Zarnoch** Effect of acorn size on development of northern red oak 1-0 seedlings 1805
- Luc Croisé, Erwin Dreyer, and François Lieutier** Effects of drought stress and severe pruning on the reaction zone induced by single inoculations with a bark beetle associated fungus (*Ophiostoma ips*) in the phloem of young Scots pines 1814
- Robert B. Brett and Karel Klinka** A transition from gap to tree-island regeneration patterns in the subalpine forest of south-coastal British Columbia 1825
- Louise Filion, Serge Payette, Ann Delwaide, and Najat Bhiri** Insect defoliators as major disturbance factors in the high-altitude balsam fir forest of Mount Mégantic, southern Quebec 1832
- P.G. Comeau, F. Gendron, and T. Letchford** A comparison of several methods for estimating light under a paper birch mixedwood stand 1843
- Miika Kajanus, Mikko Kurttila, and Mauno Pesonen** A simultaneous-equation model for predicting the production frontier of a forest holding 1851

<b>R.-P. Wei, C.R. Hansen, N.K. Dhir, and F.C. Yeh</b> Genetic gain with desired status number in breeding programs: a study on selection effects	1861
<b>Katri Paukkonen and Anneli Kauppi</b> Effect of coppicing on root system morphology and its significance for subsequent shoot regeneration of birches	1870
<b>Jon Kehlet Hansen, Henrik Saxe, Anders Ræbild, Christian Nørgård Nielsen, Jens Peter Simonsen, J. Bo Larsen, and H. Wellendorf</b> Decline and physiological response to foliar-deposited salt in Norway spruce genotypes: a comparative analysis	1879
<b>Celia A. Evans, Eric K. Miller, and Andrew J. Friedland</b> Nitrogen mineralization associated with birch and fir under different soil moisture regimes	1890
<b>Note of Appreciation / Note de reconnaissance</b>	ii
<b>Obituary / Nécrologie</b>	v
<b>Author Index for Volume 28 / Index des auteurs pour le volume 28</b>	AI-1
<b>Contents for Volume 28 / Sommaire pour le volume 28</b>	C-1

